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lowing Table, what period of the year is most fatal at that advanced period of life.

Out of 57 Deaths, there occurred in different Months—							
January	2	April	4	July	4	October . .	10
February . .	6	May	4	August . .	3	November	6
March	5	June	5	September	5	December	3
Proportion } per cent. }	22·81	.. ..	22·81	.. ..	21·05	.. ..	33·33

On the Fires in London during the 17 years from 1833 to 1849 inclusive, showing the numbers which occurred in different Trades, and the principal Causes by which they were occasioned. By SAMUEL BROWN, Esq., Fellow of the Institute of Actuaries.

UNTIL within a very recent period the doctrines of probability have been applied to scarcely any great public purpose except the assurance of human life. In that particular department of knowledge, a number of labourers have been for many years busily occupied in gathering the facts, endeavouring to classify events, and trace some general laws. In later years, researches have been extended into the effects of different classes of diseases upon health and longevity. Still more recently, the calculations of fidelity risks, of railway and other accidents, of bankruptcy and of other circumstances affecting the person of an individual, or his commercial dealings, have been made with a view of proving their capability of being estimated for insurance.

It is remarkable that, in the midst of all these inquiries, the classes of insurance for which England first became famous, and which, in fact, by their early success, led to the still more extraordinary progress which has distinguished the system of Life Assurance, viz., Fire and Marine Risks, have been almost wholly neglected as matters of statistical research. It is not by this remark intended to convey an impression, that the system on which the Fire Insurance Offices are conducted is in the least degree deficient in that experience on which such important affairs must mainly depend; or that the skill of the managers is inferior to that which is required in the business of Life Assurance. On the contrary, the remarkable success, and the stability of those great Companies, and the enormous amount of property which has been secured from risk by their means in this kingdom—to say nothing of the foreign assurances, which their honourable dealing, and their guarantee of accumulated wealth, have attracted—are the best proofs of the sagacity and experience of those who have so creditably managed their transactions. But whilst the facts connected with the Assurance of Life have been recorded and published, and whilst they have thus led the way to many new and important applications of the doctrine

of probability, those of Fire and Marine Insurance have never been made public. The immense collection of data which must have been gathering for upwards of 130 years, in the books of some of the older Companies, would present many very curious results, both as to the actual facts regarding the frequency and the extent of damage by fire, as well as to the changes in the values of property of various kinds in all parts of the kingdom. They would serve to indicate, also, the gradually improving condition of the public mind, by the increasing desire of the people to avail themselves of the advantages offered by the system of Insurance. The effect of these admirable associations in preserving the stability of our institutions, by the interest which they give, even to the labouring classes, in the defence of order against anarchy, and prudent but gradual improvements against reckless innovations, have scarcely yet been sufficiently appreciated. It may be too much to expect that private Companies should make their affairs public for the sake of any vague and undefined good which the speculator may deem will result to general science, or political economy, by the knowledge which they have acquired in the way of business, and which is exclusively their own. It is probable, however, that not only would no injury result to the Companies from the publication of their experience; but, on the contrary, the greater satisfaction and confidence of the public would amply repay the trouble and expense, whilst a vast and novel field of observation would be open to the inquirer.

The skill and judgment which has hitherto distinguished the managers of that class of business in the selection of the risk, so far from being rendered valueless by the general conclusions drawn from a comparison of events, would be more than ever appreciated by the insured, from their perceiving the difficulty of classifying the risks under their proper heads, and the study and attention which must be given to attain success. Not only would curious information be afforded, but some observations of great utility to the public probably secured. Thus, the proportion of fires, according to the different trades, would exhibit the greater or less hazard with which various occupations are attended from this cause; and if the causes were stated in each division, attention would be directed so as to ascertain what dangers were inherent in the nature of the business, and what might arise from circumstances capable of being remedied, and the risks diminished. Most of these facts are, no doubt, already known to those connected with Insurance Companies, whose business it is occasionally to compare them. But it does not fall within the scope of their duty to warn the public of consequences; and till these are forced upon the notice of the public, or of authorities competent to interfere, no remedy will be proposed, and no correction applied.

The data which may be found in the records of the Fire Insurance Companies, are (similar to those of Life Insurance Companies with regard to human life) the most perfect that can be obtained. They possess, however, one great advantage, that a very few years serve to form a sufficient average, since their progress can be observed from year to year, whereas in the latter the whole duration of life of all the individuals existing at a given time must be followed out to allow of any sound conclusions being drawn from the observations. I sincerely hope that the growing spirit of inquiry will induce many of those, who so thoroughly understand the subject

now feebly touched upon, to draw together such observations as can be relied upon, and favour the public with a more perfect collection of data than can at present be offered. No one can deny the vast importance of the inquiry. The amount of property insured against fire in 1848 was £811,000,000; and the nominal capital subscribed to guarantee the due fulfilment of these engagements at the end of 1849, was computed at more than £50,000,000, by 59 Companies; some of them, however, guaranteeing under the same capital also life and maritime risks.

Within the last few years, different accounts have been given of the fires in London; but they will be found, on examination, all to be drawn from the same source—the excellent Reports of Mr. Braidwood, the Superintendent of the Metropolitan Fire Brigade, to the Committee for managing the London Fire Engine Establishment. Mr. Baddeley, Civil Engineer, has for many years given most interesting Reports in the *Mechanic's Magazine*, embracing not only the substance of the facts detailed in Mr. Braidwood's Reports, but a general narrative of the fires which have occurred in the year, and which have excited particular interest, either from the magnitude of the losses, the destruction of human life attending them, or the unusual incidents which have made them notorious. He has also taken the opportunity of offering the most valuable suggestions, which his experience and practical acquaintance with the subject entitle to the highest respect, as to the points to which the attention of the public or of the authorities should be directed. In the *Statistical Journal* for 1838, will be found a general account of the formation of the London Fire Engine Establishment, which may be referred to for a general summary of the constitution and organization of this useful force. The same paper contains a summary of all the fires which occurred in the years 1833 to 1837 inclusive, within the range to which these engines can proceed, extending to places even 10 or 15 miles distant from London; the proportion of "wholly consumed," "seriously damaged," and "slightly damaged"; the proportion in each month, in each day of the week, and in each hour of the day; a list of the occupations in premises in which more than six fires occurred during the above five years—of the causes generally which lead to those fires, and the causes also distinguished in some of the trades in which more than 20 fires occurred in the period, and the proportion of insured and uninsured. These Tables present at one view many of the leading deductions from the facts at that time recorded. In the volume of the same Journal for 1844, p. 361, may be seen Mr. Braidwood's Report for 1842, and a general abstract of the fires which have occurred in London during the ten years 1833 to 1842 inclusive. In the next succeeding volume the list of fires for that period is given for every occupation (180 in number), with the causes in each, so far as they could be ascertained; the total number of fires recorded being 7499. In a very useful little book by Mr. Hillman, entitled 'Familiar Illustrations of the Theory and Practice of Assurance,' the facts contained in Mr. Baddeley's Reports from 1836 to 1845 are brought together, and the averages deduced to illustrate "The Theory of Probabilities," and the small deviation which occurs from the average, even in a class of facts which would appear at first sight to be so little under the control of general laws. As in the first number of the *Statistical Journal*, he compares them also under the arrangement of months and days, occupations, and causes. He applies also the experience of the actual facts to the total number of

dwellings which are stated in the 'London Directory' to be occupied by individuals of different trades. This is an important point in showing the relative liability to fires of various employments, and their greater or less degree of hazard from fire. It can only be deemed a rough approximation; but unfortunately must remain the nearest approach we can make to correctness, until the Insurance Companies, which possess the most complete, we might almost say the only perfect data for forming this comparison, shall have given to the public the results of their experience.

In presenting to the reader a continuation of the Tables which have been before enumerated, and which are still derived from the same authentic sources, the Reports of Mr. Braidwood from 1843 to 1849, I gladly take the opportunity to express my deep obligations to my friend Mr. W. M. Browne, of the Westminster Fire Office, both for the use of the papers from which the facts have been collected, and for the kind assistance which I have derived from his long-trying experience and valuable advice on this as well as on former occasions. The Annual Reports of Mr. Baddeley, which have been continued from year to year in the *Mechanic's Magazine* up to the same date, have been freely used. I can only regret that, though interesting in themselves, the conclusions to be drawn from the Tables must still be imperfect, without a more accurate account of the numbers in each class of occupation, and the progress of new buildings from year to year in the precise range within which the fires occurred. It is evident, that as the buildings within ten miles of London increase, the fires also may be expected to increase; but whether the proportion is greater or less than in former years, is a question which depends upon both classes of facts being accurately known. It appears reasonable also to suppose that though the buildings may increase rapidly in villages and towns at the extreme distance from London (from 10 to 15 miles) at which the engines have any chance of arriving before the premises are consumed, the fires may increase in faster proportion than the buildings, for want of the organized establishments at hand, which, in London itself, may afford such prompt and efficacious assistance. Could not the railroads, the completion of which has certainly tended to add to the buildings at that distance from London, be organized to offer their aid by transmitting intelligence through their electric lines, and having a special fire engine, capable of being easily transferred from the rail to the road, always ready to proceed to the nearest station with a part of the London force for the scene of action? Had the project once entertained of uniting all the lines of railway in a circle about ten miles from the metropolis ever been completed, what remarkable facilities might have been afforded in protecting the growing suburbs from the fearful calamities of fire, as well as the other dangers to which property and life are exposed!

Comparison of Fires, and Damage caused by Fire, in different periods.—To proceed, however, to the facts contained in Mr. Braidwood's Reports, the following Table will be found to comprise all the observations recorded under these heads, for the 17 years from 1833 to 1849 inclusive; the first 15 subdivided into periods of five years, to allow of a comparison being made in each period:—

TABLE I.

*Statement of Fires and Alarms of Fire in London and the vicinity for
17 years, 1833 to 1849 inclusive.*

YEAR.	Totally destroyed.	Consider- ably damaged.	Slightly damaged.	Gas.	No Gas.	Total Fires.	False Alarms.	Chim- ney Alarms.	Total Alarms.	Total of Fires and Alarms.
1833	31	135	292	96	362	458	59	75	134	592
1834	28	116	338	130	352	482	57	112	169	651
1835	31	125	315	172	299	471	66	106	172	643
1836	33	134	397	195	369	564	66	126	192	756
1837	22	122	357	203	298	501	82	134	216	717
	145	632	1699	796	1680	2476	330	553	883	3359
1838	33	152	383	228	340	568	79	108	187	755
1839	17	165	402	250	334	584	70	101	171	755
1840	26	204	451	236	445	681	84	98	182	863
1841	24	234	438	300	396	696	67	92	159	855
1842	24	224	521	331	438	769	61	82	143	912
	124	979	2195	1345	1953	3298	361	481	842	4140
1843	29	231	489	311	438	749	79	83	162	911
1844	23	237	502	322	440	762	70	94	164	926
1845	23	253	431	307	400	707	81	87	168	875
1846	25	233	576	388	446	834	119	69	188	1022
1847	27	273	536	411	425	836	88	66	154	990
	127	1227	2534	1739	2149	3888	437	399	836	4724
1848	27	269	509	447	358	805	120	86	206	1011
1849	28	228	582	418	420	838	76	89	165	1003
	55	497	1091	865	778	1643	196	175	371	2014
TOTAL. 17 years.	451	3335	7519	4745	6560	11,305	1324	1608	2932	14,237

It will thus be seen that the total number of alarms of fires which have been attended by the engines of the establishment in the whole period, was 14,237; but of this number, the total number of false alarms was 1324, and the large number of 2932 were chimney alarms, leaving 11,305 which come under the designation of fires, or an average of 665 every year. The proportion of alarms given does not differ much from the average in any of the periods, as will appear by the following Table; although, if we take into account the increase in the number of buildings, it may be considered rather less in recent than in the earlier periods. With regard, however, to alarms which prove to be only from fires arising in chimneys, the diminution is considerable from the first to the last period, and would seem to indicate either that a greater degree of carefulness prevails, or that the inmates of houses were more careful in extinguishing fire in the early stage—in either view, a satisfactory conclusion to arrive at.

TABLE II.

Showing the proportion per cent. of total Calls for Fires.

YEARS.	Alarms.	Chimney Alarms.
1833-37	9·82	16·45
1838-42	8·72	11·62
1843-47	9·25	8·45
1848-49	9·73	8·69

The average number of fires has been steadily increasing in each of the quinquennial periods, as will appear by the following:—

TABLE III.

Showing the Average number of Fires, and the proportion per cent. in each period.

YEARS.	Average Number of Fires per Year.	Per Cent.
1833-37	495·2	17·98
1838-42	659·75	23·95
1843-47	777·6	28·24
1848-49	821·5	29·83
	2754·05	100·

The last period consists only of two years; but it still shows an increase on the preceding period of five years. The question, however, remains open, whether this increase is more rapid than that of buildings in the metropolitan districts in the same periods. A more curious Table is that of the comparison of damages, and the periods are compared under the three heads as follow:—

TABLE IV.

Showing the proportion per cent. of Buildings Destroyed, or Partially Destroyed, by Fire.

Proportion per Cent.					
	1833-37.	1838-42.	1843-47.	1848-49.	Total. 1833-49.
Totally destroyed..	5.85	3.76	3.27	3.35	3.99
Seriously damaged..	25.53	29.68	31.56	30.25	29.50
Slightly damaged..	68.62	66.56	65.17	66.40	66.51
	100.	100.	100.	100.	100.

From which comparison it may be inferred, that in a long period of years the proportion "totally destroyed" would be about 4 per cent.; "seriously damaged" 29½ per cent.—together 33½ per cent.; and "slightly damaged" 66½ per cent. For the ten years, from 1836 to 1845, Mr. Hillman, distinguishing them under the heads of total, half, and quarter losses, gives these proportions respectively as 4.4, 29.4, and 66.2 per cent.—a very slight difference. It will be noticed also, that the number "totally destroyed" has been gradually diminishing till the last period.

Increased use of Gas.—The facts given in the Reports also allow of a comparison being made of the proportion of buildings in which gas was employed or not. The increased consumption of gas is very rapid, especially within the last two years; and it is evident from the result, that if danger may be apprehended from the employment of this valuable medium of producing light, that the danger cannot be perceived to have increased with the more extensive use made of it.

TABLE V.

Showing the increased consumption of Gas in the several periods.

YEARS.	Proportion per cent. of Fires in which Gas was found to be used on the Premises.	Of 100 Buildings in which Gas was consumed. Proportion per cent. in each period.
1833-37	32.15	18.88
1838-42	40.78	23.95
1843-47	44.73	26.26
1848-49	52.65	30.91
Total average, } 1833-49.. }	41.97	100.

By comparing the second column with the second column of Table III., it will be noticed, that whilst the use of gas has increased from 19 in the first to 31 per cent. in the last period, the increase in the proportion of the number of fires has not been more than from 18 to 30 in the same time. In the 7th volume of the *Statistical Journal* it is stated, that in the first ten years above recorded the proportion of cases of fire, in which gas was found to be used on the premises, had increased from one-fourth at the beginning to three-fourths of the whole number of fires at the end of the ten years. The writer appears to have fallen into a slight error, having compared the former with the fires in which no gas was found to be used on the premises, instead of the whole number of fires. The total number of fires attributed to various accidents from gas were, in the first ten years, 413 out of 2141 buildings in which it was used, or 19·3 per cent. In the last seven years, they were 364 in 2604 buildings in which gas was consumed, or only 14 per cent.

Fires in different Months.—The regularity with which the fires have occurred in different months of the year, is shown by the following Table, in which it has been considered sufficient to give the summary of the ten years from 1833 to 1842, compared with those from 1843 to 1849, inclusive; this being the division followed subsequently in the classification of trades. Though January and December comprise together, as might be expected, a larger proportion than any other two following months, yet the difference between the winter and summer months is very small. The proportions from April to September inclusive, in the former period, are 49·06 per cent. of the fires in the whole year; and in the latter period, 49·26 per cent.; showing by their close correspondence, how well we may rely on observations extending over a sufficient number of years.

TABLE VI.

Showing the proportion of Fires which happen in each Month of the Year.

MONTH.	Total Fires, 1833 to 1842.	Proportion per cent.	Total Fires, 1843 to 1849.	Proportion per cent.
January . . .	502	8·69	505	9·13
February ..	452	7·83	437	7·90
March	496	8·59	449	8·12
April	429	7·43	399	7·21
May	485	8·40	465	8·41
June	474	8·21	446	8·06
July	467	8·09	457	8·26
August	532	9·21	481	8·70
September ..	446	7·72	477	8·62
October	471	8·16	429	7·77
November ..	500	8·66	443	8·01
December ..	520	9·01	543	9·81
	5774	100·	5531	100·

Fires on different Days of the Week.—The proportions of fires happening on the various days of the week approach very closely to the average to be expected. The only circumstance worthy of remark, appears to be the large proportion of fires occurring on a Sunday, when it might be supposed that numbers of workshops, and those portions of a building in which trades are carried on, would by the cessation from labour have a respite also from the chances of so fearful a calamity. Yet the proportion, in each of the periods, falls very little short of any of the other days of the week. The explanation appears to be, that in many small private houses, and in manufactures where it is necessary to keep up the fires till work is resumed, the attendance is more negligent; and a fire having smouldered without observation through the whole of the Sabbath, bursts forth before attention has been drawn to it. Some of the most extensive fires which have occurred, have happened on the Sunday evening or early on Monday.

TABLE VII.

Showing the proportion of Fires which have occurred on various Days of the Week.

DAYS.	Total Fires, 1834 to 1842.	Proportion per cent.	Total Fires, 1843 to 1849.	Proportion per cent.
Monday	760	14·30	773	13·98
Tuesday . . .	805	15·14	792	14·32
Wednesday .	781	14·69	785	14·19
Thursday ..	755	14·20	812	14·68
Friday	742	13·96	762	13·78
Saturday . . .	742	13·96	826	14·93
Sunday	731	13·75	781	14·12
	5316	100·	5531	100·

In the above Table, the fires on days of the week for the year 1833 not being given in Mr. Baddeley's Reports, the nine years previous to 1843 are compared with the seven following years. The numbers are sufficiently near in each period to have shown any peculiarity that might exist; but there seems nothing that requires comment beyond the large number of fires occurring on Sunday, as noticed above.

Fires at different Hours of the Day.—A very remarkable regularity exists in the proportion of fires at the different hours of the day. In the following Table, the proportion may not only be compared as to the hours at which they occurred, but as to the change which has taken place in the two periods 1833 to 1842, and 1843 to 1849. Those who are curious on the subject will also find in the first volume of the *Statistical Journal*, p. 291, a similar comparison for the years 1833 to 1837 only. The minimum number of fires occurred in all the three periods from five to nine in the morning. The proportion for the ten years 1833 to 1842 does not differ much from the first five years of the period, being 10·37 in the former, and 10·46 in the latter; but there is a diminution at these hours in the seven years 1843 to 1849, which is only 9·82 per cent. The diminution is still greater in the last period from 9 A.M. to 4 P.M., being 17·43 per cent.

compared with 21·19 per cent. in the ten years, and 21·84 in the first five years only. The proportion continues to increase steadily at almost every hour, in all the three periods above mentioned, from 9 A.M. till 10 P.M.; but the most rapid increase is from 5 P.M. to 2 A.M., in which nine hours 58 per cent. of all the fires occurred in the first ten, and 61 per cent. in the last seven years.

TABLE VIII.

Showing the proportion per cent. of Fires which have occurred at different Hours of the Day and Night.

HOUR.	Proportion per cent.		HOUR.	Proportion per cent.	
	1833 to 42.	1843 to 49.		1833 to 42.	1843 to 49.
A.M. 5th	2·25	2·80	P.M. 5th	3·55	3·71
6	2·23	1·90	6	4·36	4·41
7	1·73	1·77	7	5·73	5·93
8	2·20	1·72	8	7·27	6·80
9	1·96	1·63	9	8·11	7·86
10	2·58	1·90	10	8·15	9·56
11	2·68	2·68	11	7·46	8·19
12	2·79	2·46	12	6·17	6·47
P.M. 1	3·34	2·69	A.M. 1	5·54	6·40
2	3·43	2·42	2	5·21	5·32
3	3·15	2·37	3	3·41	4·63
4	3·22	2·91	4	3·48	3·47
	31·56	27·25		68·44	72·75

It will not fail to be observed, that in the last period there has been a great diminution of fires during the hours of daylight, and an increase during the night, which may possibly explain why the numbers totally destroyed and seriously damaged, added together, have not borne the much smaller proportion to the total number of fires which might have been expected from the increased efficiency of the Fire Brigade, and facilities of prevention. During the night, it may be supposed that causes of conflagration would smoulder unperceived, till the flames break out beyond the power of ready extinction. The proportions of totally destroyed and seriously damaged, compared with slightly damaged, in the two periods, are—

Proportion per cent. of Total Fires.		
	1833 to 1842.	1843 to 1849.
Totally destroyed . .	4·66	3·29
Seriously damaged . .	27·90	31·17
Together . . .	32·56	34·46
Slightly damaged . .	67·44	65·54
	100·	100·

Proportion of Insurances against Fire.—We will now proceed to a Table, showing the proportions of buildings and contents on which insurances have been effected, as deduced from the facts given in Mr. Baddeley's Reports from 1836 to 1849. I have subdivided them into a greater number of periods, in order to show the gradual though steady progress which has been made in the prudent feeling of all classes, to provide against the destruction of property by this fearful element.

TABLE IX.

Proportion per cent. of Insurances ascertained to have been effected in cases of Fire.

	1836 to 37.	1838 to 42.	1843 to 47.	1848 to 49.	Whole Period, 1836 to 49.
Buildings and Contents ..	32·11	37·33	37·73	41·27	37·58
Buildings only	11·27	14·37	16·23	17·22	15·24
Contents only	16·90	15·49	14·30	12·54	14·69
Neither	39·72	32·81	31·74	28·97	32·49
	100·	100·	100·	100·	100·

These particulars relate exclusively to property in which the fire originated, not comprising the cases in which damage was done to the contiguous premises.

Thus it appears that on the average of the whole period, $67\frac{1}{2}$ per cent. have been insured in some way or other, and $32\frac{1}{2}$ per cent. not insured at all, and that the proportion not insured at all has diminished from nearly 40 per cent. in the first period to 29 per cent. in the last; whilst of those who have had the prudence to insure both buildings and contents, the proportion has increased from 32 per cent. in the first, to upwards of 41 per cent. in the last period. Even the gradual increase of the "buildings only" insured, compared with the diminution of "contents only" insured, is probably a favourable feature, since buildings may, in most cases, be presumed to require larger insurances than the contents, except in the case of some particular trades. This is a question, however, which, though interesting to the political economist, in estimating the increasing wealth or prudent habits of the people, can only be answered by the Insurance Companies, from the combination of facts which I fear it will be some time before we can expect will be brought together, or the results made public. The proportions given above are deduced from the reports of the fires, as stated above, only as regards the buildings in which they commenced. In the year 1841 a more careful inquiry was instituted, and all the cases in which either property in houses or their contents were damaged by fire were enumerated. Only 12 cases in 2,136 remained unknown. The following is the result:—

In 1841.	Insured.	Not Insured.	Unknown.	Total.	Proportion Insured per cent.
Buildings	914	197	10	1,121	81·53
Contents	609	404	2	1,015	60·
	1523	601	12	2,136	71·30

It thus appears that $81\frac{1}{2}$ per cent. of the number of “buildings” were insured, and 60 per cent. of the “contents”; and of either one or the other, out of the total cases of damages by fire reported, about $71\frac{1}{2}$ per cent., leaving $29\frac{3}{4}$ per cent. wholly uninsured. This differs nearly 3 per cent. from the averages deduced in the former Table, and may probably, from the greater care exercised, be taken as a correction, though only the result of a single year. It does not touch, however, the important question, what proportion of the *value* of a property remains on an average uninsured?

Proportion of Fires in different Trades and Occupations.—This portion of the subject, though a curious and interesting branch of inquiry, must, in some degree, be left for future investigation, since we have endeavoured in vain to trace the proportion of houses occupied by different trades in the various parts of London and the environs, to which the operations of the Fire Brigade extend. The Registrar-General, in the census about to be taken in the ensuing year, will probably obtain a more perfect enumeration of the numbers of persons classified in various trades and occupations, than has ever before been made; and if the mortality in the previous and ensuing years can also be distinguished, some very remarkable deductions may be made on the effect of various occupations on the health and duration of life to persons engaged therein. If, at the same time, an account be taken of the number of houses in the metropolis and the environs, of the trades carried on in each, and of the locality, equally curious results might be exhibited as to the objects of our present inquiry. In the meantime, however, it will be sufficient to arrange all the facts hitherto collected as to fires in different trades in the two principal periods, which we have already pointed out as containing nearly an equal number of facts, there having been 5,774 fires in the 10 years 1833 to 1842, and 5,531 in the 7 years 1843 to 1849. In the original Returns, the number of houses in which “gas” and “no gas” was used, is given for each trade; but as the general results of the use of gas have been already stated, and it does not appear that the employment of it depends much upon the nature of the occupation, I have not thought it necessary to subjoin the figures. The proportion of fires, however, in each trade, to the total numbers which have occurred, is given in each of the periods, as stated in the following Table:—

TABLE X.

Showing the number of Fires which occurred in London and its Environs in the ten years 1833 to 1842, and in the seven years 1843 to 1849, in different Trades and Occupations.

	1833 to 1842.				1843 to 1848.			
	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.
Apothecaries (no Chemical Works)	1	10	8	19	..	8	11	19
Archel-makers . . . .	..	1	..	1	..	..	..	..
Asphalte Works . . . .	..	1	1	2	..	..	1	1
Bacon-driers . . . .	..	..	3	3	..	1	3	4
Bagnios . . . .	..	8	21	29	..	9	26	35
Bakers	7	46	87	140	3	28	82	113
Do. sea-biscuit . . . .	..	2	1	3	1	2	1	4
Do. muffins . . . .	..	..	1	1	..	..	3	3
Barge and Boat Builders . . . .	..	5	6	11	..	..	6	6
Basket-makers	2	4	2	8	..	2	3	5
Bath-keepers . . . .	..	..	1	1	..	2	1	3
Baths and Washhouses . . . .	..	..	..	..	..	1	..	1
Beer-shops	3	9	20	32	1	22	41	64
Blacking-makers . . . .	..	1	1	2	..	..	2	2
Bleachers . . . .	..	..	..	..	..	1	..	1
Booksellers, Binders, and Stationers . . . .	..	40	39	79	..	36	36	72
Bottle-merchants . . . .	..	1	..	1	..	..	2	2
Brewers . . . .	..	8	5	13	1	2	4	7
Brick-makers . . . .	..	..	1	1	..	1	..	1
Bridges . . . .	..	..	..	..	..	1	..	1
Brokers and Dealers in Old Clothes	3	23	22	48	1	23	25	49
Builders	2	1	8	11	8	15	16	39
Butchers . . . .	..	1	1	2	..	1	6	7
Cabinet-makers	15	39	30	84	7	45	39	91
Camphor-merchants . . . .	..	..	..	..	..	1	2	3
Caoutchouc - manufacturers . . . .	..	5	2	7	1	1	2	4
Cane-dyers . . . .	..	2	..	2	..	1	2	3
Carpenters and Workers in Wood (not cabinet-makers)	24	96	125	245	20	81	108	209
Carriers	1	1	..	2	..	..	2	2
Cartgrease-makers . . . .	..	1	..	1	..	1	1	2
Cement and Plaster of Paris Works . . . .	..	2	..	2	..	..	..	..
Chandlers	6	16	26	48	2	31	46	79
Charcoal and coke, dealers in . . . .	..	2	9	11	1	5	11	17
Cheese-mongers	3	6	11	20	1	13	9	23
Chemists (including chemical laboratories)	2	18	20	40	..	5	10	15
Chocolate-makers . . . .	..	..	1	1	..	1	..	1

	1833 to 1842.				1843 to 1848.			
	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.
Churches	1	8	9	18	2	2	12	16
Cigar-makers .....	..	3	1	4	..	2	4	6
Coach-makers	5	7	13	25	1	9	8	18
Cochineal-dryers .....	..	..	1	1	..	..	..	..
Coach-painters	1	..	..	1	..	..	..	..
Coal-merchants .....	..	..	..	..	2	2	6	10
Cocoanut fibre-manu- facturers .....	..	..	..	..	..	3	..	3
Coffee-shops and Chop- houses	1	8	25	34	2	15	45	62
Coffee-roasters .....	..	5	14	19	1	..	8	9
Colour-makers (not mere colour-shops) .....	..	5	10	15	..	3	4	7
Comb-makers .....	..	1	..	1	..	..	..	..
Confectioners and Pas- try-cooks)	1	8	12	21	..	9	15	24
Coopers	3	1	5	9	1	8	10	16
Cork-burners	1	1	3	5	..	1	4	5
Cork-cutters	1	3	..	4	..	3	..	3
Corn-chandlers	2	11	3	16	3	16	7	26
Corn-mills .....	..	..	1	1	..	..	..	..
Cotton-wool, workers in	1	2	3	6	..	1	..	1
Cotton-wick-manufac- turers .....	..	1	..	1	..	1	..	1
Cotton wick-winders .....	..	..	..	..	..	1	..	1
Curriers and leather- sellers	2	5	4	11	..	7	9	16
Distillers .....	..	13	7	20	..	2	4	6
" Herbs .....	..	..	..	..	..	1	..	1
" Illicit .....	..	3	3	6	..	1	2	3
" Naphtha .....	..	..	..	..	..	1	1	2
" Tar	2	4	1	7	..	2	1	3
" Turpentine .....	..	..	..	..	1	1	2	4
Docks .....	..	1	4	5	..	3	3	6
Drapers (woollen, linen, and mercers)	3	46	67	116	4	67	88	159
Druggists (wholesale)	1	..	..	1	..	2	4	6
Dry-salters .....	..	1	3	4	..	..	..	..
Dyers .....	..	5	7	12	..	3	6	9
Eating-houses	1	3	36	40	..	6	28	34
Engineers (mechanical) .....	..	..	..	..	1	6	5	12
Farming stock	3	27	3	33	5	41	1	47
Feather-merchants	1	5	6	12	..	4	4	8
Fell-mongers	1	1	1	3	..	10	..	10
Felt-makers	1	..	1	2	..	3	..	3
Fire Preventive Com- pany .....	..	1	..	1	..	..	..	..
Firework-makers	4	10	6	20	2	20	10	32
Firewood (patent) ma- nufacturers .....	..	..	..	..	..	2	..	2
Flax-makers .....	..	1	6	7	2	1	4	7

	1833 to 1842.				1843 to 1848.			
	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.
Floorcloth - manufacturers	1	2	1	4	4	2	1	7
Founders .....	..	12	14	26	..	6	10	16
French Fancy Ware-houses .....	..	..	2	2	..	1	2	3
Furriers and skin-dyers	2	4	3	9	1	12	11	24
Gaming-houses .....	..	1	1	2	..	..	2	2
Gas Works .....	..	7	18	25	..	3	15	18
Glass and Emery Paper-makers .....	..	1	..	1	..	2	1	3
„ Blowers .....	..	..	1	1	..	2	3	5
„ Illicit .....	..	2	3	5	..	..	..	..
„ Benders .....	..	1	..	1	..	..	..	..
Glue-makers .....	..	1	1	2	..	2	1	3
Granary-keepers	1	1	1	3	..	1	..	1
Grocers	7	23	29	59	5	42	22	69
Gunpowder, sellers of	..	1	..	1	..	1	..	1
Gunproof House .....	..	..	..	..	..	1	..	1
Hair - dressers (using ovens) .....	..	..	1	1	..	..	..	..
Hat-makers	2	32	23	57	3	33	16	52
Hemp and Flax Merchants	1	2	..	3	..	2	..	2
Horsehair-merchants ..	2	1	5	8	..	3	1	4
Horse-slaughtermen ..	..	..	..	..	..	1	..	1
Hotels (including Club-houses) .....	..	13	26	39	..	10	34	44
Ink-makers	1	1	..	2	..	..	1	1
Japanners	1	5	5	11	..	6	3	9
Lampblack-makers ..	1	6	5	12	..	3	1	4
Laundresses	1	6	8	15	..	5	13	18
Leather (patent) makers .....	..	2	3	5	..	8	2	10
Lime Wharfs .....	..	..	1	1	..	2	1	3
Linen-manufacturer ..	..	..	..	..	1	..	..	1
Livery Stables .....	..	1	4	5	..	..	..	..
Lodging Houses	2	66	372	440	..	70	457	527
Lucifer Match-makers ..	..	36	27	63	..	23	18	41
Lunatic Asylums .....	..	..	..	..	..	..	2	2
Maltsters	1	4	1	6	1	1	2	4
Manchester Ware-houses .....	..	1	10	11	1	8	16	25
Manganese - manufacturers .....	..	..	1	1	..	..	..	..
Marine Stores, dealers in	2	7	14	23	2	7	20	29
Markets .....	..	..	..	..	1	..	..	1
Mattress-makers .....	..	2	2	4	..	2	4	6
Mast and Block Makers	1	..	..	1	1	1	..	2
Millers	3	..	..	3	..	..	..	..
„ Steam .....	..	2	3	5	..	2	..	2

	1833 to 1842.				1843 to 1848.			
	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.
Milliners and Dress- makers .....	..	..	..	..	..	1	..	1
Musical Instrument- makers .....	..	6	4	10	2	14	6	22
Mustard-makers .....	..	..	1	1	..	1	..	1
Naphtha-manufacturers	1	1	1	3	..	1	..	1
Nurserymen .....	..	..	..	..	..	1	1	2
Nuts, dealers in .....	..	..	2	2	..	..	3	3
Oil and Colourmen (not colour-makers)	7	28	52	87	6	38	45	89
Oil and Preserve Merchants	1	..	1	2	..	..	..	..
Oil-refiners .....	..	..	1	1	..	..	..	..
Oil Works	1	2	..	3	..	..	..	..
Painted Baize-makers	1	2	1	4	2	5	2	9
Painters, Plumbers, and Glaziers	1	4	8	13	..	8	1	9
Panoramas .....	..	..	2	2	..	..	..	..
Paper-hangers	1	..	1	2	..	..	..	..
„ Mills .....	..	3	1	4	..	..	..	..
„ stainers .....	..	1	5	6	..	4	4	8
Pasteboard-makers ...	..	..	..	..	..	2	..	2
Pawn-brokers	3	8	6	17	1	7	3	11
Perfumers .....	..	..	1	1	..	..	1	1
Picture-dealers .....	..	1	..	1	..	..	..	..
Pipe-makers .....	..	1	3	4	..	..	2	2
Pitch-makers .....	..	2	..	2	..	..	..	..
Playing-card-makers...	..	1	2	3	..	1	1	2
Pork-butchers .....	..	..	3	3	..	4	3	7
Potteries .....	..	..	2	2	..	2	1	3
Poulterers .....	..	..	..	..	..	3	..	3
Printers & Engravers	3	10	23	36	1	16	22	39
„ Copper-plate ...	..	8	7	15	..	3	3	6
„ Ink-makers	1	3	..	4	..	1	..	1
Prisons .....	..	2	2	4	..	1	1	2
Private	27	304	1604	1935	13	315	1321	1649
Public Buildings	5	5	13	23	..	5	15	20
Public Places (not Theatres) .....	..	1	..	1	..	2	6	8
Rag-merchants	1	10	10	21	1	5	5	11
Railways .....	..	2	..	2	2	4	14	20
Ribbon Drapers .....	..	..	1	1	..	..	..	..
Rope-makers .....	..	8	6	14	3	5	1	9
Sack-makers .....	..	2	2	4	..	2	3	5
Sail-makers	1	..	1	2	1	3	1	5
Sale-shops & Offices (no hazardous goods)	19	83	223	325	14	77	147	238
Saltpetre-refiners .....	..	1	..	1	..	..	..	..
Saw Mills	3	6	6	15	4	13	8	25
Schools of Industry ..	..	..	2	2	..	1	2	3
Scum-boilers .....	..	..	..	..	1	..	3	4
Ships .....	..	18	19	37	1	15	32	48
„ Breakers .....	..	..	1	1	..	..	..	..

	1833 to 1842.				1843 to 1848.			
	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.
Ship-builders	1	3	8	12	..	2	4	6
„ chandlers .....	..	3	1	4	..	2	..	2
„ Steam .....	..	6	10	16	..	2	4	6
„ „ Builders .....	..	1	..	1	..	1	1	2
Shot-manufacturers ..	..	1	..	1	..	..	..	..
Silk-dressers .....	..	..	1	1	..	..	..	..
„ winders .....	..	..	..	..	..	1	..	1
Snuff Mills	1	..	..	1	..	..	1	1
Soda-water-makers ..	..	..	..	..	..	..	9	9
Soot-merchants .....	..	1	8	9	..	..	9	9
Spice-merchants .....	..	..	1	1	..	..	..	..
Stables	11	43	59	113	2	38	56	96
Starch-makers .....	..	3	..	3	..	5	1	6
Stay-makers .....	..	..	..	..	..	2	3	5
Steam-boiler-makers ..	..	4	..	4	..	..	..	..
„ Mills	1	..	..	1	..	..	..	..
Straw-bonnet-makers ..	..	1	4	5	..	9	9	18
Sugar-refiners	3	4	4	11	1	3	2	6
Tailors	1	19	22	42	..	25	27	52
Tallow-chandlers, Mel- ters, Wax-chandlers, & Soap-boilers	6	11	20	37	2	15	17	34
Tarpaulin-makers	2	1	..	3	..	6	3	9
Theatres	1	..	9	10	2	..	10	12
Tinmen, Braziers, and Smiths	4	15	36	55	..	19	38	57
Tobacco - manufactu- rers .....	..	5	3	8	..	2	2	4
Tobacconists .....	..	4	6	10	1	16	24	41
Toy Warehouses .....	..	2	..	2	1	1	2	4
Turpentine-distillers ..	2	..	..	2	..	..	..	..
Type-founders .....	..	..	1	1	..	1	..	1
Varnish-makers	2	4	2	8	..	7	3	10
Victuallers	18	87	219	318	10	85	166	261
Vinegar Works .....	..	1	2	3	..	..	..	..
Vitriol Works .....	..	..	1	1	..	..	..	..
Under repair and building	2	15	32	49	9	11	32	52
Unoccupied	4	11	30	45	2	6	22	30
Upholsterers	1	5	10	16	1	2	6	9
Wadding-makers .....	..	8	2	11	..	9	6	15
„ „ Gun .....	..	..	..	..	..	..	1	1
Warehouses	3	12	30	45	1	1	1	3
Watchglass-makers ..	..	..	..	..	..	1	..	1
Waterproof Canvas- makers .....	..	1	..	1	..	..	..	..
Water Works .....	..	..	..	..	..	1	..	1
Weavers .....	..	..	..	..	1	1	..	2
„ Carpet .....	..	..	1	1	..	..	1	1
„ Silk	1	3	5	9	..	..	..	..
„ Willow .....	..	1	1	2	..	..	..	..
Wharfingers .....	..	..	1	1	2	1	8	11

	1833 to 1842.				1843 to 1848.			
	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.	Totally destroyed.	Considerably damaged.	Slightly damaged.	Total.
Whiting-makers	1	1
Willow-bleachers	1	..	1
Wine and Spirit Merchants	12	42	54	..	5	35	40
Wire-weavers	1	1
Wood-merchants	4	2	6	..	2	3	5
Wool-staplers	1	1	2	1	1	..	2
Workhouses	6	7	13	..	2	3	5
Workshops (no hazardous goods in process)	8	4	12
	269	1611	3894	5774	182	1724	3625	5531

Several curious subjects for reflection may be suggested by this statement, amongst which is the great increase in the yearly average of fires in some particular occupations. For instance, "beershops," "coffeehouses," and "chophouses" show a proportion which has increased cent. per cent. in the second period. "Chandlers" have increased 75 per cent., and "drapers" 40 per cent. In all these cases it is open for inquiry, at what rate the numbers of houses occupied by the trade have increased in the same period. The great increase of fires on railways will be noticed, which have increased from 2 in 10 years to 20 in 7 years. A fire in "waterworks" may seem an anomaly; but one is placed under that head as having committed serious damage.

Out of the various trades enumerated in the Table, we will select for comparison only those in which, in either one or the other of the two periods, more than one-hundredth part of the total number of fires occurred. In order to form some rough estimate of the ratio of risk incurred by each of these trades, it is necessary to ascertain the number of houses occupied by each trade; and at present no better resource is available than a reference to the 'Post Office Directory' for the year 1846, being the mean of the latter seven years. To the general ratio per cent. of the total number of fires I have added a column showing the proportion per cent. of fires out of the total number of houses occupied by the respective trades, as ascertained from this source. In "private houses," and "sale-shops and offices," which represent very large numbers, this test could not be applied, the former including in the fires those which occurred in the dwelling portion of houses otherwise occupied as shops, and the latter being too indefinite to be distinguished.

TABLE XI.

Showing the proportion per cent. of Fires in the principal Trades to the Total number of Fires which occurred in each of the two periods 1833-42, and 1843-49; together with the proportion per cent., in the latter period, of the Average number of Fires per annum to the Total number of Buildings occupied by each Trade in 1846.

Occupation.	Proportion per cent.		Houses Occupied in 1846.	Ann. Aver. per cent. of Fires to do.
	1833 to 42.	1843 to 49.		
Bakers	2·49	2·17	2295	·75
Beer-shops	·55	1·16	700	1·31
Book-sellers	1·37	1·30	850	1·18
Cabinet-makers	1·46	1·65	613	2·12
Carpenters	4·24	3·78	1320	2·27
Chandlers	·83	1·43	291	3·88
Coffee-shops and Chop-houses	·59	1·12	718	1·25
Drapers	2·01	2·88	850	2·67
Grocers	1·02	1·25	2890	·34
Hat-makers	·99	·94	96	7·74
Lodging-houses	7·62	9·53	456	16·51
Lucifer Match-makers	1·09	·74	20	30·00
Oil and Colourmen	1·51	1·61	816	1·56
Private	33·50	29·81		
Sale-shops and Offices (not hazardous goods)	5·63	4·30		
Stables	1·96	1·73		
Tinmen, Braziers, and Smiths	·95	1·03	337	2·42
Victuallers (Licensed)	5·51	4·72	4320	·86
Under repair and building	·85	·94		
Unoccupied	·78	·54		
Wine and Spirit Merchants	·94	·72	935	·61
	75·89	73·35		

In the trades above enumerated, about three-fourths of the whole number of fires occurred; and it will be observed as a gratifying fact, that not only has there been a slight diminution in the proportion within the last seven years, but that the diminution has been greatest amongst those trades in which the greatest proportion of fires had previously happened. It may perhaps be inferred, that the reduction is not merely a casual circumstance; but the result of greater care, vigilance, or means of averting the calamity of fire. Thus the proportion in "private houses" is reduced from 33·50 to 29·81 per cent.; in "sale-shops and offices" from 5·63 to 4·30; amongst "licensed victuallers" from 5·51 to 4·72; and amongst "carpenters" from 4·24 to 3·78 per cent. The principal increase has been in "lodging houses," from 7·62 to 9·53 per cent.; amongst "drapers," 2·01 to 2·88; and "cabinet makers," 1·46 to 1·65 per cent.

An examination of the last column will show, even by this rude attempt to compare the facts in the different trades, how erroneous it would be to draw conclusions of the ratio in which different occupations are exposed to the risk of fire, merely from comparing the number of fires themselves. In many cases where the fires are actually the most numerous, they bear the smallest proportion to the number of houses represented as occupied by that

particular occupation. Thus the "lucifer match makers," amongst whom only occur 74 in 10,000 fires, would appear, from the small number engaged in the trade, to be liable to fires at the rate of 30 per cent. per annum, or that one fire would occur amongst them in every three years and four months, supposing, of course, that the names in the 'Directory' comprise the whole number of houses engaged in the trade. On the other hand, "bakers," amongst whom 2·17 per cent. of the fires occurred, would appear only liable to the risk at the rate of 75 per annum in 10,000 houses occupied by them; and "grocers" in less than half that number, or 34 in 10,000, the proportion of the total fires amongst them being also one-half the other. Amongst "chandlers" 3·88 per cent. of the buildings occupied by them are damaged by fire in the year; and just double that number amongst the "hatters," although the risks amongst the former comprise only 1·43 per cent. of the fires, and amongst the latter about two-thirds only of that proportion. It is sufficient at present to point out the want of information on a topic at once curious and useful; and to indicate how a census, comprising an enumeration of the numbers of the population engaged in different trades, and of the number of buildings occupied by each, may be turned to a practical and public use. For want of some such information, the writer in the *Statistical Journal* states, that with regard to fires—"Among the trades, 'victuallers' have an unenviable pre-eminence; the number of fires in this class of houses amounts to 156" (out of 2476 from 1833 to 1837). Whereas it will appear in our Table, by comparing them with the number engaged in the business, that though the proportion of fires to the total number is 5·51 per cent. in the ten years within which his comparisons are comprised, yet the proportion to the houses so occupied was on the average of the last seven years little more than 86 in 10,000; that they stand only fourth from the lowest in the list that I have given; and do not amount to the twentieth part of fires which occurred in "lodging houses," and are just one-ninth of what happened amongst "hat makers."

Although the information is so deficient at present, as to render any conclusions with regard to the risks of insurance too unsafe to be admitted, it may not be uninteresting to show in what manner the facts might be used; assuming, for the present, that the record is sufficiently near to the truth to permit of its practical application to varying the premiums according to the risks of different trades. We will take only two or three of those occupations in which the largest numbers are found in the 'Directory,' and which, from their nature, are more plainly defined than others—amongst bakers, for instance, numbering 2295, and amongst whom the average of fires appears to be 2·17 for every hundred fires that occur. Let us again assume that every house is insured to its full value, and, for the sake of simplicity, that that value is on an average £100 only to each house. We understand well enough what a "total loss" means. It may be more difficult to define what is meant by "seriously damaged," and "slightly damaged." The records of Insurance Offices will probably show damages paid for a burnt cap—a jacket which a lucifer match in the pocket has seriously injured—a carpet which the spilling of live coals has irretrievably ruined—a sheet which the cat has dragged against the fire, a picture or a book spoilt by smoke, or a bed curtain which a drunken lodger has set fire to at the imminent risk of his own and others' lives. Many of the fires to which the indefatigable Mr. Braidwood and his gallant Fire Brigade have been

called, have arisen from equally trivial causes, as our readers will see hereafter; but we are now considering only those which it has been thought necessary to report, and it will suffice for the present purpose to assume that "seriously damaged" means where one-fourth of the property has been destroyed, and "slightly damaged" where one-tenth only has been consumed. The damage books of Insurance Offices could probably show, on the average of a multitude of cases, the exact proportion (which may differ in different trades) of the property destroyed to its full value, or at least to the value insured. The above admission, however, will equally well answer our present purpose to show the use of the facts when brought together. Turning to Table XI., then, it will be seen that amongst bakers in every hundred fires there will be $3\frac{1}{3} \times £100$, $25 \times £25$, and $71\frac{2}{3} \times £10$. Total about £1674·7 of property destroyed; and as the proportions of fires to the trade are given as 75 in 10,000, every 10,000 houses would be liable annually to loss by fire of £1256; or the premium from these rough data would be rather more than 2s. 6d. per cent. This includes the ship biscuit and muffin bakers, the proportion of "total loss" in the first of these having been 1 in 4 in the seven years. The grocers, 2890 in number, in the same way represent "total losses" 7·25, "seriously damaged" 60·87, and "slightly damaged" 31·88. Total, taking £100 for each insurance with the proportion as before, £2565·5; but the fires being only ·34 per cent., the premium from each house will appear as ·087, or 1s. 9d. for each £100 insured. Again, licensed victuallers we have enumerated as 4320 in number. They form an important class. The fires amongst them are represented as 86 in 10,000 annually. The proportions of "total losses" are 3·83; of "seriously damaged," 32·57; of "slightly damaged," 63·60 per cent. Therefore supposing each insured for £100 ($3·83 \times £100$) ($32·57 \times £25$) and ($63·60 \times £10$)—total £1833 for the actual losses in 100 fires, which for every 100 houses would give an annual loss of £15·76, or a premium of 3s. 2d. would be necessary from each.

It is generally estimated that there are in the metropolis at the present time about 300,000 houses, and we have seen that the number of fires are more than 800, or about $2\frac{2}{3}$ to every 100 houses. Taking the proportion of "total losses" as 4, "seriously damaged" $29\frac{1}{2}$, and "slightly damaged" $66\frac{1}{2}$, as we found them to be from 1833 to 1849, we should have ($4 \times £100$) ($29\frac{1}{2} \times £25$) and ($66\frac{1}{2} \times £10$) average payment = £1802·5 in every 100 fires; and which being multiplied by $2\frac{2}{3}$, would, for each 1000 houses insured for £100 each, show a loss of £4806, or nearly 1s. per cent. Supposing that on an average only half the property was insured, it is evident that the premiums would only be half sufficient to meet the claims, and consequently they must be doubled. If 25 per cent. were uninsured, the premiums paid would only be equal to £75 in every £100; and therefore the premiums to be actually paid must be increased by one-third. These rough calculations are independent of all expenses, interest on capital, &c. Many other points would be necessary for consideration in preparing a collection of data for such a purpose. Thus, no doubt, the locality, the construction of the buildings, the distance from a fire engine station, and, still more, the manner in which an adjoining building may be injured by a fire breaking out in a neighbour's house, would have to be considered. A fire so arising may be the cause of serious damage, which could not be

attributed to the trade carried on there, but to the dangerous proximity of other trades. Still all these cases would form averages in the long run, even the amount of damage inflicted by a fire in one trade on the houses adjoining; and a collection of such facts would bring together subjects of curious and eventually useful inquiry.

Causes of Fires.—We now proceed to a Table showing the general summary of the causes by which fires have been occasioned, divided into the same periods as the last Table. A careful inquiry is instituted by the firemen into the origin of every fire, and endeavours are made, as far as possible, to ascertain the causes which led to it. The difficulty of arriving at any certain result is no doubt very great. Some cannot be traced, because it is the interest of parties to conceal the fact; and Mr. Baddeley, in the course of his excellent Reports, gives many striking instances of suspicion which have been justly excited, but in which the suspected parties have escaped, in spite of almost proof of guilt. The reluctance of the offices to interfere in the matter, or their unwillingness to lose reputation by refusing to pay a claim, is but natural, even though, if the case were contested, it might often lead to the detection and punishment of a criminal. In other instances, the natural confusion of mind in moments of such danger, the difficulty of tracing the cause when the bursting forth of flames and smoke may have concealed the circumstance, or the spot in which the fire commenced; the large proportion of fires which occur in the night-time, the length of time which a fire may smoulder before it breaks out, leading the party questioned to look for incidents more recent than the actual origin, and various other explanations, may be offered as to the diversity of causes alleged. It will appear, however, that every year more minute information is obtained, and it is remarkable within what narrow limits the principal causes keep to the average in a long series of years. Every year, too, the proportion remaining undiscovered is diminished. From 1833 to 1837 about 20 per cent. were unknown; but, on the average of 1833 to 1842, less than 12 per cent. remained undiscovered, and from 1843 to 1849 little more than 7 per cent. The minuteness of inquiry will not only tend to give greater facilities of drawing useful conclusions, by enabling the inquirer to classify facts; but will lead, as it has already done, to direct attention to those causes which are of most frequent occurrence, and capable of remedy by watchfulness or change in habits. It serves also to indicate how men of science can give their services most effectually in the preservation of life and property. Thus the greatly increasing cause of fires, “spontaneous ignition,” has led to some interesting chemical experiments into the nature of substances that may be thus dangerous to society without human agency. It is remarkable that one of the earliest instances which led an eminent chemist to investigate this subject, was the wretched fate of a young man in 1829, who was hanged as an incendiary, when it afterwards appeared clear to him and several other scientific men, from careful inquiries, that the fire was caused by “spontaneous combustion” only. The danger of the use of naphtha lamps would also not have been so visible, if the accidents from this cause had not been distinguished as we see them in the following Table:—

TABLE XII.

Showing the Causes of Fires in the two periods 1833 to 1842, and 1843 to 1849; with the proportion per cent. from each Cause to the Total number of Fires in each period.

CAUSES.	1833 to 1842. Total No.	Proportion per cent. of Fires.	1843 to 1849. Total No.	Proportion per cent. of Fires.
Accidents of various kinds, for the most part unforeseen and unavoidable	293	5·07	90	1·63
Apparel ignited on the person	48	·83	27	·49
Bleaching (baskets, brushes, nuts, ginger, and straw)	3	·05	12	·22
Candles	514	8·90	623	11·26
Carelessness, palpable instances of	171	2·96	120	2·17
Cat (upsetting chair, lucifers, clothes-horse)	6	·10	15	·27
Chemical experiments . . . . .	..	..	2	·04
Children (playing with candles, fire, gunpowder, lucifer matches)	101	1·75	137	2·48
Chimneys taking fire and igniting the building	12	·21	..	..
Cinders (and soot, put away hot)	4	·07	55	·99
Coffee (and chicory, &c.) roasting	5	·09	7	·13
Coke (burning of) and cork do. . . . .	..	..	5	·09
Coppers (set against partitions or on floors)	4	·07	12	·22
Curtains, bed and window	882	15·29	857	15·49
Drunkenness	38	·66	46	·83
Fire (sparks from, and from locomotive engines)	89	1·54	268	4·84
Fires (kindled on hearth, and other improper places)	73	1·26	63	1·14
Fireworks (making, selling, or letting off)	28	·49	42	·76
Fire-heat (applications of, to manufacturing purposes)	269	4·66	..	..
Flues (defective or over-heated, foul, blocked up, &c.)	696	12·05	555	10·03
Friction of machinery	10	·17	7	·13
Fumigation (and bug hunting)	30	·52	19	·34
Furnaces	119	2·06	132	2·39
Gas (escape of, defective or repairing fittings, accidents in lighting, &c.)	413	7·15	364	6·58
Gunpowder	16	·28	6	·11
Hearths (defective)	3	·05	15	·27
Hot-water and air-pipes . . . . .	..	..	3	·05
Illumination	3	·05	..	..
Kilns over-heated	3	·05	12	·22
Lamps (oil, naphtha, and sparks from)	28	·49	48	·87
Lightning	6	·10	5	·09
Lime (slaking or heating)	27	·47	34	·62
Linen (drying or airing before the fire)	252	4·36	255	4·60
Lucifer matches (making, using, accidentally ignited by rats, &c.)	85	1·47	104	1·88
Naphtha (rectifying, experimenting with) . . . . .	..	..	6	·11
Ovens (over-heated, defective, &c.)	69	1·20	48	·87
Reading (and sewing) in bed	13	·23	8	·14
Shavings (loose, ignited, &c.)	145	2·51	187	3·38
Smoking meat, &c. . . . .	..	..	4	·07

CAUSES.	1833 to 1842. Total No.	Proportion per cent. of Fires.	1843 to 1849. Total No.	Proportion per cent. of Fires.
Spontaneous ignition (coals, cotton, India rubber matting, guano, greasy rags, hay and straw, lamp black, lucifer matches, oil and sawdust, &c.)	91	1·58	132	2·39
Steam boilers (heat and explosion of, and locomotives)	2	·03	9	·16
Still (illicit)	4	·07	7	·13
Stoves (defective and over-heated, gas, drying pipes, hot-air, &c.)	299	5·18	311	5·62
Sugar boiling .....	..	..	1	·02
Suspicious	48	·83	77	1·39
Tobacco (smoking, &c.)	77	1·33	163	2·95
Turpentine (melting, also camphor, sulphur, sealing-wax, &c.)	21	·36	121	2·19
Wilful	85	1·48	126	2·28
Unknown	689	11·93	391	7·07
	5774	100·	5531	100·

On examining this Table it will be noticed that an increase appears to have taken place under some of the causes in the latter; but allowance must be made for the proportion "unknown" having diminished nearly 5 per cent. in the second period. The numbers formerly under this head will consequently be classed under some other known cause. Of the causes in which the greatest diminution is found may be mentioned "unavoidable accidents," from 5·07 to 1·63 per cent.; "carelessness," from 2·96 to 2·17 per cent.; "flues," from 12·05 to 10·03 per cent.; "gas," from 7·15 to 6·58 per cent.; and "ovens," from 1·20 to ·87 per cent. On the other hand, after making allowance for the unknown becoming known, there appears an increase in accidents attributed to "candles," from 8·90 to 11·26 per cent.; to "children playing with fire, &c.," from 1·75 to 2·48 per cent.; "fire, sparks from, &c.," from 1·54 to 4·84 per cent.; "lamps" (which is principally owing to the use of naphtha), from ·49 to ·87 per cent.; and "tobacco smoking, &c.," from 1·33 to 2·95. This Table may serve to point attention to those causes in which excess prevails, and suggests to every householder the importance of care in those matters which, however trivial they may appear, may end in an event of so deplorable a character. It is painful to observe that "wilful fires" have increased from 1·48 to 2·28 per cent. To this the attention of the police rather than of the householder should be directed.

A similar inquiry might be made into the principal causes of fire under the different trades and occupations (of which we have given the list in Table XI.), with the view of ascertaining what proportion appears to depend on the nature of the trade, and what is more general and capable of being diminished by the exercise of vigilance or precaution. A general summary was given from Mr. Braidwood's Report in the *Statistical Journal*, vol. vii. for 1844, for the ten years 1833 to 1842; and I have collected the facts, but with a more minute subdivision of causes, for the seven years 1843 to 1849. Space, however, will not permit the comparison to

be made in this number of the *Assurance Magazine*. If the subject should appear to be of sufficient interest it may be completed in a future paper; and in the meantime it will be sufficient to exhibit the proportion occurring by various causes, in what are described to have happened in private dwellings. The total number of fires in private houses from 1843 to 1849 was 1649. It should be remarked that this term comprises any private portion of a dwelling in which a fire originated, even though the rest of the house might be occupied for purposes of trade, the object being to distinguish between fires which are caused by the accidents of trade, and those not so arising. Every cause has been stated, and the list will be found to comprise nearly every one included in the general catalogue. The principal exceptions are "spontaneous ignition" and "accidents from machinery."

TABLE XIII.

Showing the Causes of Fires in Private Dwellings, and the proportion in this class per cent. of the Total Fires.

CAUSES.						No. of Fires.	Total.	Proportion per cent.
Candle	..	..	..	..	..	..	222	13.46
Carelessness	..	..	..	..	..	..	10	.61
Cat	..	..	..	..	..	6		
"	upsetting	lucifers	..	..	..	1		
"	"	candle	..	..	..	1		
"	"	clothes-horse	..	..	..	1		
Dog	"	"	..	..	..	1	10	.61
Children	..	..	..	..	..	20		
"	left	..	..	..	..	1		
"	playing	with lucifers	..	..	..	13		
"	"	with fire	..	..	..	25		
"	"	with fireworks	..	..	..	1		
"	"	with candle	..	..	..	1	61	3.70
Copper fire	..	..	..	..	..	2		
"	flues	..	..	..	..	23		
"	furnace	..	..	..	..	1		
"	badly set	..	..	..	..	3		
"	set in floor	..	..	..	..	1		
"	overheat of	..	..	..	..	1	31	1.88
Curtain	..	..	..	..	..	..	526	31.91
Chair falling into fire	..	..	..	..	..	..	1	.06
Flues	..	..	..	..	..	152		
"	blocked up	..	..	..	..	10		
"	foul	..	..	..	..	14		
"	adjoining	..	..	..	..	20		
"	of hot plate	..	..	..	..	6		
"	"	in adjoining house	..	..	..	1		
"	hot-air	..	..	..	..	1		
"	kitchen	..	..	..	..	6		

CAUSES.	No. of Fires.	Total.	Proportion per cent.
Flues, oven	1	218	13·22
„ laid on timber	1		
„ soot in	1		
„ defect in	4		
„ timber in kitchen	1		
Hearth, timber under	3	13	·79
„ fire on	7		
„ defect in	3		
Firemen not being called	1	·06
Fire grate, heat from	2	13	·79
„ place set on floor	3		
„ grate, defect in	1		
Furnace, hot water	1		
„ of boiler	1		
Kitchen range	3	16	·97
„ grate	1		
„ cooking apparatus adjoining	1		
Gas	10	16	·97
„ explosion of	2		
„ from the street	3		
„ escape of	1		
Hot ashes	1	8	·48
„ „ in dust bin	1		
„ cinders	5		
„ charcoal	1		
Incendiarism	9	·55
Intoxication	19	1·15
Insanity	1	·06
Lamp	1	6	·36
„ night	1		
„ naphtha	3		
„ „ upset	1		
Light dropped down the area	1	·06
Lucifers	18	1·09
Lightning	3	·18
Oven	1	·06
Old age	1	·06
Poker falling out of fire	1	·06
Repairs	1	·06
Salvage drying	1	·06
Sparks	9	63	3·82
„ from fire	53		
„ from lamp	1		
Stove	8	1	·06
„ in library	1		
„ in adjoining house	4		
„ heat of	7		
„ hot air	1		

CAUSES.	No. of Fires.	Total.	Proportion per cent.
Stove, hot plate	1	31	1·88
„ badly set	3		
„ pipe	4		
„ overheat of pipe	2		
Soot taking fire	1	3	·18
„ put away on fire	2		
Turpentine, bottle of, falling near a candle	1	·06
<i>Accidents from domestic employments, &c.</i>			
Airing bed	2	68	4·12
Bed, reading in	5		
„ smoking in	1		
„ sewing in	2		
Bleaching walnuts	1		
Boiling tar	3		
„ pitchpot boiling over	1		
„ drawing off tar	1		
„ heating ether	1		
„ varnish boiling over	1		
„ melting grease	1		
„ „ bees' wax with turps	1		
„ making varnish	2		
Bug hunting	2		
Burning charcoal	1		
„ wood placed in coal cellar	1		
„ old paper	1		
Experiment	1		
Fireworks	1		
Gunpowder, playing with	1		
Fumigation	11		
Firewood laid on the stove to dry	1		
Fire raking out on hearth	1		
Iron hanger put away hot	1		
Lamp left burning in cupboard	1		
Mattress placed before the fire to dry	1		
Private still	1		
Pasting charts	1		
Tarring a water-butt	2		
Tobacco smoking	18		
Doubtful	16	·97
Unknown	275	12·68
		1649	100·

It will not fail to strike the reader, in comparing this class with the general causes, that whereas, in the latter, accidents attributed to “candles” were 8·90 per cent., they here form 13·46 per cent. of the whole; that whilst “curtains” claimed 15·29 per cent., they here figure as nearly 32 per cent. “Flues” do not differ much, being 12·05 in the latter, and

13·22 per cent. in the above Table. Accidents from "gas," as might be expected, are very few in private houses, only ·97 per cent., whilst in all trades combined they form 7·15 per cent. We should, perhaps, scarcely expect to find the domestic "cats" so effectively mischievous. The fires caused by their agency are ·61 per cent. The large proportion of 1·15 per cent. is attributed to "intoxication"; and though ·61 per cent. arises from pure "carelessness," many of the other causes, which we have placed together under the head of "domestic employments," partake very strongly of the same character, as will appear on inspection of the Table. Out of 68 fires of this class 18 arose from "tobacco smoking." Lastly, it may be remarked, that the large number of 16·68 per cent. in private dwellings are described as due to causes "unknown"; although during the same period, if these be deducted from the general total "unknown," it will leave only 2·10 per cent. in which the causes of fires in various trades were undiscovered.

Causes of Fires in which the Premises were Totally Destroyed.—I had prepared a small Table in which the different fires under this head were classified in the two periods of ten and seven years, under the respective causes which appeared to have led to the total destruction of the premises. These are generally given as "the distance from London, or the nearest station for engines," which sometimes extends even to ten or twelve miles; "the tardy or insufficient supply of water" (in one case in which two large floor-cloth manufactories and two private houses were burnt down, one plug was not open for half an hour, and another for an hour and a half); "the combustible nature of the buildings or materials contained in them," such as cabinet-makers, carpenters' workshops, in timber-sheds, oil-warehouses, &c.; "the small size of the buildings"—in one case seven small unfinished cottages, used as a workshop, connected together by stacks of timber in front, and in another case nine houses (seven being small private houses) were burnt by lightning; the "excessive age of the premises," from which the houses fell in before any decided attempt could be made to save them; and lastly, "the extent to which the fire had arisen before the arrival of the engines." Under these different heads altogether 450 events were classified; but it was so difficult to separate one cause from another, (the want of water, for instance, or the distance from the nearest station, and the small size or the combustible nature of the building, being frequently all combined as elements of destruction,) that I found it useless to print the proportions at present, though an attempt has already been made to compare these causes in the *Statistical Journal*. It may be remarked, however, that from 1833 to 1837, in 145 fires described as "total losses," 182 buildings were destroyed; and from 1843 to 1847, in 181 fires, 229 buildings were destroyed, both being very nearly in the same proportion; namely, 126 buildings to 100 fires. In the last year, 1849, there was no more than one building "totally destroyed" in any one fire, a gratifying fact, which had not occurred before since the establishment of the Fire Brigade.

The space allowed us has been so occupied with the collection and arrangement of the large mass of facts with which we have been favoured, and in bringing together the results to the latest period, and in such a form that from the comparison of the same in two different periods we might, if

possible, draw some useful conclusions from them, that we could not now touch upon many topics which are, nevertheless, of the highest interest and importance. The large number of fires which are suspected, and, by the indefatigable exertions of Mr. Payne, the coroner, in recent cases, frequently proved to be "wilfully occasioned," are beginning to assume a most serious aspect. It is very much to be feared, that the liberality of the Insurance Companies, forced on, perhaps, by the efforts to maintain a high reputation against a competition equally dangerous to the public and themselves, leads to the prompt settlement of losses in some cases in which, if a public prosecutor existed, a criminal would be punished instead of a sufferer rewarded. Many instances might be cited from the reports in the newspapers of the day, or from those collected by Mr. Baddeley, not merely of doubtful cases, but even of some in which the verdict of a coroner's jury has declared, that "the house was wilfully set on fire by, &c." Yet the parties have escaped. In another frightful case five lives were lost. The landlord had insured house and furniture *one week* before the fire, for double the value set upon them by the assessor of the Fire Office. He accepted the diminished value rather than proceed to trial. In another case, a party had insured for £800, and he claimed "£680 for a fire which took place in a shop 15 feet long by 9 feet wide, and which did not burn for a quarter of an hour." The claim was disputed, on the ground that the fire had been wilfully caused, and that the claim was fraudulent. The case wore so bad a complexion that the plaintiff's counsel withdrew, and he was non-suited. It would be a curious subject of inquiry, and one on which only the records of Insurance Offices could throw light, what is the average length of time that an insurance endures before a fire takes place, and in cases where it occurs very much below the average time, whether the general tendency to make an insurance below the value of the property is not reversed. Another point worthy of observation would be, whether, out of a given number of individuals assured in a particular trade, more than the average proportion of claims is paid in the course of a few years to the same individuals. We read of one case in which it was stated that "this was the third fire which had happened on the premises of the insured."

The subjects of spontaneous ignition (and it is stated as a remarkable fact in 1846, that nearly every fire which has happened on railway property has originated in spontaneous combustion)—of inadequate supply of water, of which the most lamentable accounts are given—of the carelessness of individuals in throwing down lighted cigars, or lucifer matches—of the danger of naphtha and other spirit lamps—and many singular topics, might be illustrated and enlarged upon from the examination of the facts recorded in this article. I must, however, leave them for the consideration of my readers, and close this hasty inquiry by a short notice of the

Fire Brigade—whose extraordinary efficiency, under the training and superintendence of Mr. Braidwood, have frequently saved from loss an enormous amount of property, which seemed destined to be the inevitable prey of the flames. The skill and intrepidity of the chief, and the exertions of the men, have preserved this great city from calamities which, in such a mass of buildings, occupied by many hazardous trades, in some cases full of combustible materials, and in some parts of the city exposed from age and nature of construction to the most fearful conflagration, if a fire once begins, it is most surprising that we should so long continue to escape.

It is still more creditable that such a body of men so organized, so devoted to the public service, so zealous and intelligent, should be paid and supported, not as in other countries, by the Government, for the good of the State, which it undoubtedly is, but by the combined efforts—the wealth and the public spirit—of private companies. These could not have been blamed if they had left the public to the tender mercies of Government protection. Their peculiar business was not to diminish, but to indemnify against loss; and if the risks were greater, the public must have paid an adequate premium. But, happily, they have taken a nobler view of their responsibilities, and the establishment of their valuable brigade has tended as much to the service of humanity as to the interests of the companies themselves. It is at the same time a standing reproof to the Government of this country that the protection which we owe from the ravages of fire is due to the mere casualties of private enterprise, and that if any cause tended to the disunion of the companies, or if the effects of competition led those which are old established to think the force too costly to maintain for the benefit of the new, a city, with two millions of inhabitants, would be left to the notorious inefficiency of parish engines, or the desultory efforts of individuals impeding each other.

Preservation of Life from Fire.—Even the necessary training for the preservation of life from fire is not regarded as a part of the duty of the police, if we may judge from the complaints which are frequently made of their incapable though zealous and anxious efforts to render assistance. The Royal Society for the Preservation of Life from Fire is one of those noble institutions with which this kingdom abounds, and of which we may justly be proud. The Report states that their object is “to provide stations, and maintain *fire escapes* throughout London, at distances of half a mile from each other.” “Every station costs the Society, for the first expenses of building fire escape, watch-box, tarpaulin, &c., about £70, and the annual cost of maintaining each, with a conductor, is about £80; and your committee take this public opportunity of stating, that, having an earnest and great desire to extend this great public good all over London, they will endeavour to establish a fire escape in any district half a mile distant from the next station, where parochial officers will so far co-operate with them as to vote a donation of £50 towards the first expenses, and £10. 10s. a year towards the annual expenses; and trust to the good feeling, the liberality, and the self-interest of the inhabitants of each district to contribute sufficient funds to continue the same in a state of efficiency.” Appealing in such a cause, and with such practical good sense in their plans, with previous success to point to, and such fearful calamities to avert, how can they appeal in vain? In the dreadful circumstances in which their servants hasten with relief, rich and poor are equally helpless; and if some of the harrowing details could be given of the circumstances in which lives were lost, and some of those in which the fire escapes of this Society have been effectual in saving life, every reader must acknowledge the value of such a Society, and willingly aid their admirable efforts. I will quote only two cases, one of which occurred at Mr. D. Bowman’s, in Tottenham Court Road, in March, last year. “The fire was discovered raging furiously in the shop; and an alarm being given, conductor Chapman, with the Royal Society’s fire escape from Hart Street, was promptly on the spot. On his arrival, the staircase was in flames, and he was told that several persons

were in the house, although they did not appear. Chapman placed his escape against the second floor window, ascended and entered, although a volume of dense black smoke was pouring from the window, which nearly overpowered him, and instantly extinguished his lamp. Three others were successively handed up to him, and one remaining alight, he commenced a search. Calling aloud, he was answered by a kind of stifled cry from a back room, which he entered, and encountered a man, who groaned out, 'Oh! save my wife!' Groping about, the conductor laid hold of a female quite exhausted, but clasping two children in her arms. Having brought them all into the front room, he placed them safely in the canvas trough of the escape, and they reached the street without injury. The conductor followed them down in a dreadful state of exhaustion, having achieved the most heroic rescue of life from fire ever recorded."

Again, in April of this year, at a fire in Foster Lane, fire-escape-conductor Myers attended with his fire escape within three minutes of the alarm. "There was great excitement and confusion, it being generally reported that from six to eight persons were in the house, unable to escape, and, from the rush of fire, the destruction of all appeared inevitable. Without a moment's loss of time, the conductor ascended to the second floor, and broke open with his hatchet the window pointed out to him. It was as much as he could do to stand against the volume of smoke which poured out, but he finally succeeded in discovering three persons in the room, quite unable to assist themselves. With the utmost difficulty, and after the most praiseworthy exertions, he eventually brought them down the escape, not, however, before two of them had been much burnt. The persons saved were Frederick Sutton, the landlord; his son, William H. Sutton; and daughter, Mary Ann Sutton."

Could the Roman bay-leaves be more worthily bestowed than on such men?

Few persons are aware of the number of lives which are sacrificed yearly in fires for want of early or efficient assistance. I give the following summary from Mr. Baddeley's Report, for the last 17 years, arranged in the same periods as my first Table, so that they may be compared with the total number of fires.

Years.	Fatal Fires.	Lives Lost.
1833-37	47	66
1838-42	77	126
1843-47	74	105
1848-49	33	45
	231	342

The following Table will show the increasing usefulness of the Society, and that a total of 113 persons have, in less than seven years, been preserved from the most horrible death by the self-devoted exertions of their servants, often at the imminent peril of their own lives:—

Summary of Fires attended, and Human Life saved, by means of the Society's Fire Escapes and Conductors, since its re-establishment in 1843.

Year.	Number of Stations.		Fires attended.	Lives saved.
To March 31st, 1845	8	increased to 11	116	13
" 1846	11	" 15	96	7
" 1847	15	" 21	139	11
" 1848	21	" 25	197	17
" 1849	25	" 26	223	31
" 1850	26	" 28	198	10
To September, 1850		28	105	24
			1074	113

The Society appears to be conducted at the most moderate expense; but the Directors, in their Report, are compelled to acknowledge that, with the exception "of the continued support of Her Most Gracious Majesty the Queen, and the handsome donation of £100 from the Corporation of the City of London, and donations from several of the city and metropolitan parishes," the Society is indebted for the present satisfactory state of its finances more to the kindness of its friends and immediate promoters, and less to general liberality, than the public character of the benefits conferred entitles it to claim. It deserves encouragement, for it is our only organized means of preservation for life against fire, as the Fire Brigade is for property—our substitute for State protection—perhaps far more efficient in proportion to its means—certainly far less costly—and honourable alike for the humanity of its objects, and for the noble devotedness, the daring courage, which its agents have displayed.

39, King Street, Cheapside,
December, 1850.